DOCUMENT RESUME

ED 439 296 CE 079 950

AUTHOR	Peters, Bridget Ayuk
TITLE	Measuring the Quality of Communication Linkages between Farmers and the Agricultural Agencies Responsible for the Diffusion of Innovations in the South West Province of Cameroon. A Summary Report of Research. Department Information Bulletin.
INSTITUTION	Texas A and M Univ., College Station. Dept. of Agricultural Education.
REPORT NO	TAMV-DIB-98-2
PUB DATE	1998-09-01
NOTE	61p.
PUB TYPE	Reports - Research (143)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	*Adoption (Ideas); Adult Education; Adult Learning; *Agricultural Education; Agricultural Production; *Change Agents; Communication (Thought Transfer); *Extension Education; *Farmers; Foreign Countries; Helping Relationship; Information Transfer; Innovation; *Interaction; Learning Motivation; Learning Processes; Models; Research; Teamwork; Technological Advancement; Theory Practice Relationship
IDENTIFIERS	*Cameroon; Facilitators

ABSTRACT

The quality of communication linkages between farmers and the agricultural agencies responsible for diffusion of innovations in the South West Province of Cameroon was examined in a study of all 25 researchers and 150 extension agents in the province and 385 farmers who were randomly selected from the province's 3,000 farmers. Data were collected through questionnaires completed by 90% of the researchers, 85% of the extensionists, and 75% of the farmers. The following were among the major findings: (1) more than half of farmers adopted food crops and related cultural practices transferred to them for that year; (2) the four most important factors responsible for farmers deciding to adopt the selected food crops were mutual trust between farmers and their information source, credibility of the information source, frequency of communication, and farm demonstration; (3) all three groups reported moderate levels of interaction with each other; (4) hierarchy characteristics and organizational goals were two of the most important factors affecting communication among the three groups; (5) all three groups reported using the hierarchical model of communication; and (6) working on immediate problems and active participation in committees were identified as two principles motivating adult learners to participate in learning activities. (Contains 112 references.) (MN)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 439 296

MEASURING THE QUALITY OF COMMUNICATION LINKAGES BETWEEN FARMERS AND THE AGRICULTURAL AGENCIES RESPONSIBLE FOR THE DIFFUSION OF INNOVATIONS IN THE SOUTH WEST PROVINCE OF CAMEROON

DEPARTMENT OF AGRICULTURAL EDUCATION

TEXAS A&M UNIVERSITY

COLLEGE STATION, TEXAS 77843

B. Peters

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

CE079950

MEASURING THE QUALITY OF COMMUNICATION LINKAGES BETWEEN FARMERS AND THE AGRICULTURAL AGENCIES RESPONSIBLE FOR THE DIFFUSION OF INNOVATIONS IN THE SOUTH WEST PROVINCE OF CAMEROON

A Summary Report of Research

by

Bridget Ayuk Peters

Department of Agricultural Education
Texas A&M University
College Station, Texas 77843-2116

Department Information Bulletin 98-2
September 1998

FOREWORD

Program planners, program evaluators, program administrators, and observers of the process of agricultural development have long been concerned with the quality of communication and types of communication linkages that exist between and among three groups of people. They are the users of technology, e.g., farmers, the change agents responsible for facilitating the adoption of appropriate technologies among the clientele that they serve, and researchers responsible for developing those new or improved technologies appropriate for farmers to use.

Attempts to improve peoples' standards of living and to increase levels of agricultural production have been undertaken by governmental ministries or parastatals to which researchers and agents of change have been assigned. However, the communication between these people and the intended beneficiaries has often been flawed.

Research has been conducted on the communication process and the diffusion of information about innovations. However, not much attention has been paid to the attitudes and feelings of the recipients of information in the communication process. Nor has much attention been paid to congruence of understanding between beneficiaries, researchers, and change agents. Thus, the research conducted by Dr. Peters, using data that she collected under difficult conditions, is timely as it addresses some of the problems involved in achieving effective communication among people with differing needs, social status, educational levels, and job responsibilities.

The research summarized herein by Dr. Bridget Peters on measuring the quality of communication linkages between farmers and the agricultural agencies responsible for the diffusion of selected agricultural innovations in the South West Province of Cameroon is one further step toward understanding answers to the questions above. Her findings and conclusions provide food for thought and have implications for application by agents of change, agricultural researchers, program planners, and others concerned with the process of agricultural development. Dr. Peters is to be commended for undertaking this research.

For more information about the research, Dr. Peters may be contacted directly by writing or telephoning her as follows:

Dr. Bridget Ayuk Peters, 7356 Crown West, Houston, Texas 77072, USA
Telephone: (281) 575-9612

James E. Christiansen, Professor
Department of Agricultural Education
College of Agriculture and Life Sciences
Texas A&M University
College Station, Texas 77843-2116 USA

September 1, 1998

ABSTRACT

Measuring the Quality of Communication Linkages Between Farmers and Agricultural Agencies Responsible for the Diffusion of Innovations in the South West Province of Cameroon. (December 1997)

Bridget Ayuk Peters,

B.S., Prairie View A&M University;

M.S., Prairie View A&M University

Chair of Advisory Committee: Dr. James E. Christiansen

Purpose

The purpose of the study was to measure the effectiveness of communication linkages among researchers, extensionists, and farmers in the South West Province of Cameroon.

Population

The population of the study consisted of 25 researchers, 150 extensionists, and food-crop farmers in South West Province of Cameroon in 1996. A random sample of 385 farmers from a population of 3,000 was selected from six divisions of the South West Province. All researchers and all extensionists in that province were included. Questionnaires were distributed in the Summer of 1996 and data from all the respondents were collected and analyzed in the Fall of 1997.

Descriptive statistics were used for reporting findings on all the research questions and causal analysis, including multiple regression and path analysis, was used for reporting findings on the second major objective. Scales measuring communication effectiveness were determined using literature review and exploratory factor analysis. Cronbach's alphas were computed to confirm the reliability of the instrument.

Major Findings

The major findings were:

1. More than half of farmers adopted food crops and related cultural practices transferred to them for that year.
2. Several factors were identified as important to farmers' decisions to adopt the selected food crops. The four most important were mutual trust between farmers and information source, credibility of source of information, frequency of communication, and farm demonstration.
3. The three groups reported a slightly moderate level of interaction with each other.
4. Hierarchy characteristics and organizational goals were identified as two of the most important factors affecting communication among the three groups.
5. The hierarchical model was reported by the three groups to be the existing model used.
6. Working on immediate problems and active participation in committees were identified as two of the principles that will motivate adult learners to participate in learning activities.
7. Teamwork was found to have the greatest effect on communication effectiveness. This was followed by group meeting, hierarchy, town meeting, communication importance, and source credibility.
8. Proximity and hierarchy were also found to be significantly related to teamwork.

TABLE OF CONTENTS

	Page
ABSTRACT	iii
INTRODUCTION	1
Problem Statement	4
Conceptual Framework	5
Delimitations	7
Limitations	7
Assumptions	13
Setting for the Study: Geography of South West Province	8
METHODOLOGY	10
Population	10
Instrument Development	11
Data Collection	12
Operational Definitions	13
Data Analysis	15
Path Analysis	16
FINDINGS AND DISCUSSION	17
Findings Related to Research Question One	17
Findings Related to Research Question Two	17
Findings Related to Research Question Three	18
Findings Related to Research Question Four	18
Findings Related to Research Question Five	18
Findings Related to Research Question Six	18
Path Analysis	21
Summary of Direct Effects	23
Other Direct Effects	24
Conclusion	27
SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS	28
Summary	28
Findings	28
Implications of Descriptive Analysis	32
Summary and Implications Related to Objective Four	35
Additional Implications	38
Concluding Statement	41
Recommendations for Action	42
Recommendations for Future Research	43
REFERENCES	44

INTRODUCTION

The population of Cameroon is approximately 13.5 million (July 1994 est), of which 71% live in the rural areas and 29% in towns and cities (Delancy, 1989). Of the 13.5 million people, 74.4% of them are employed or involved in agriculture, with the small farms producing 93% of the national agricultural production. Agriculture and forestry sectors provide a high degree of self-sufficiency in staple foods, commercial and food crops including coffee, cocoa, grains, livestock, and root starches. The importance of agriculture to the Cameroon economy is further illustrated in the World Bank report of 1990, which estimated the per capita gross product (GDP) at $960, with 24% coming from agriculture. The key role of agricultural development in the country's economy is often reaffirmed by various officials in their speeches, yearly budgets, and five-year development plans focused exclusively on the improvement of the living standards of farmers and rural dwellers.

To increase agricultural development in any country requires a mix of conditions. Development, exchange, and utilization of agricultural technology together with infra-structures; markets, and land reforms are considered crucial ingredients in the mix of essentials for agricultural development (Haverkork & Rooling, 1984). To promote agricultural development, information must reach the farmers' level in time and in usable form. Researchers, traditionally, are not best equipped to transform their results into a form understandable to the farmers. Therefore, a major role of extension is to translate this information into culturally usable recommendations, adapted to farmers' level of understanding and resources (McDermott, 1987). Effective communication of scientific innovations to the millions of farmers is one of the main aims of change agents and the key to the development of any nation. It is more so in developing nations where information gaps are very wide (Chamala, 1981).

Leaving out the contribution of communication to development in any agricultural system, neglects translating the results of research into technology and recommendations,and adapting these on the basis of their impact on farmers.

Axinn and Thorat (1972) pointed out that "the secret ingredient" that makes agriculture

of some countries scientific, efficient, and highly productive is the integration of services relating to agricultural production. However, the precise nature of the integration depends on the context of the technology system. With continued growth in agriculture, farmers' need for integrated services increases, because they need access to more information. The greater farmers' access to usable information, through appropriate channels, the more important knowledge and utilization of technology becomes as a major determinant of development (Jiggins, 1989). Communication, although an essential ingredient of change, is nevertheless dependent on other inputs from other sectors including such things as roads, housing, educational facilities and technological development. Therefore, the success of communication on development depends on joint and co-operative machinery and for policy planning which takes such needs and such interdependence into consideration.

There is a growing emphasis on improving the linkages and relationship between extension and research agencies in other developed countries and the developing nations (Blackburn, 1989; McDermott, 1987; Roling, 1990). A major consideration for the development of a successful Extension system is its knowledge base and, interdependently, its research, extension and farmer linkages.

There also is a clear relationship among information, agriculture, and progress (Wete, 1991). Policy makers and donor organizations have identified weak links between extension and researchers as a major factor limiting technological change and progress in agriculture. Some have sought to improve those links through policy changes and institutional reorganizations (World Bank, 1985; Crawford, 1982).

Administrative structures in many developing countries concerned with agricultural problems lack communications and administrative links to coordinate research, education, and extension effectively (Ewell, 1986; Sall, Hamidou, Ousseni, & Kraft, 1988).

Sims and Leonard (1990) point out that when extension and research do not share common goals, communication linkages between them often are nonexistent. This is true even in cases where both are officially mandated to provide agricultural technology to farmers. Researchers might, in practice, be more interested in producing scientific papers than in solving

problems of farmers. The above situation was found in Cameroon by Tchouma (1987) when he investigated the linkages between extension, research, and subsystems in Western province. Insufficient cooperation between extension and research in many countries has been attributed to the fact that these agencies were established without complementarity. Their location in the administrative and governmental structure, as well as values that govern their staff, have made this relationship more prone to problems (Cernea, Coulter, & Russell, 1985).

Furthermore, the need for linkage between farming systems development (FSD) and extension is seen as an essential ingredient in the successful utilization of research (Friedrich & Hall, 1989). Poorly functioning links between research and extension disrupt the flow of the stream or, at worst, prevent it from flowing at all (Roling, 1986b). The need for effective two-way communication linkages between agricultural research and extension is beyond dispute, but reasons for poor communication linkages vary between countries, just as the actual form of linkage established must be specific to a particular country's administrative, sociocultural, and agroeconomic conditions.

However, Eponou (1993) cited several studies, including one by the International Service for National Agricultural Research, about linkages among the three groups in seven developing countries. The findings from these studies revealed that the absence of linkages in some systems resulted in technology being irrelevant to farmers' needs and technology transfer groups not being aware of existing relevant technology. In summary, policies and strategies have focused separately on agricultural research groups and technology transfer groups. However, it is the interaction or relationship of these two groups that largely determines whether resource-poor farmers gain access to technology, and whether technology is relevant.

The nature of the relationship among and between researchers, extensionists, and farmers as well as factors determining their communication relationships have been widely discussed in the literature on agricultural development. These factors include, but are not limited to, such things as educational gaps, status, organizational goals, administrative structure, and credibility (Kaimotwitz, 1988; Sims & Leonard, 1989; Bennell 1989).

Despite the need for improving communication linkages, there is not much evidence

that any one research-extension system leads to weak linkages while another encourages stronger ones. For example, some countries using the principles of the Training and Visit (T&V) extension system espouse closer links with research institutions, but others have had problems. The U.S. land-grant model, which combines research, education, and extension under one institution, is one of the most prominent models, but researchers have warned that it also has limitations (Beal, 1989).

Given that the factors hindering or strengthening communication linkages do differ from country to country and even from program to program, it is necessary for policy makers, donors, and those involved in the diffusion of innovations to examine or interpret problems with communication linkages using the principle of "situation specificity" (World Bank, 1990a).

Purpose of the Study

The purpose of this study was to measure the quality of communication linkages among farmers, researchers, and extensionists in Cameroon. The objectives developed to accomplish this purpose are as follows:

1. Assess the quality of communication linkages among and within the researchers, extensionists, and farmers.
2. Assess the level of interaction among and within the three groups.
3. Identify factors affecting the level of effectiveness of communication linkages among the farmers, researchers, and extension workers toward the adoption of an innovation.
4. Measure the impact of the identified factors by farmers on the communication effectiveness.
5. Identify the practices adopted by farmers from the South West Province who were identified as having received innovations and recommendations from the extension and research programs.
6. Assess the opinions of participants on the effectiveness of the existing communication model.
7. Assess the perception of participants on some adult learner principles.

Research Questions

To accomplish the objectives listed above, the following research questions were be addressed.

1. How effective is the communication linkage in promoting the rapid adoption of innovations as perceived by the three groups under study?
2. How often are the existing communication links used as perceived by researchers, extensionists, and farmers?
3. What are the personal and background experiences or characteristics of the three groups under study?
4. Are there significant differences in the perceptions of the three groups toward factors affecting or promoting the effectiveness in use of existing communication linkages in the diffusion of innovations?
5. What is the current pattern of communication linkages among the farmers, extension workers, and researchers as perceived by members of each of the three groups?
6. What do farmers, extension workers, and researchers from South West Province perceive the existing communication model to be?
7. What are the perceptions of farmers, extension workers, and researchers from South West Province toward some adult learners' principles?

Conceptual Framework

The communication of information from research through technology transfer mechanisms to farmers in developing countries has received much attention from public sector institutions. However, increasing emphasis is now being given to the need for intensive collaboration among researchers, farmers, and extensionists in developing educational packages for producers. Lionberger (1986) refers to this process as the "information integration" function.

In developing effective links within and between institutional agricultural technology

systems, a high degree of interdependence should exist among the three groups. The individuals participating in these systems should be strongly collaborative and facilitated by good communication. The members of each group should have certain values, attitudes, and goals that should motivate them to relate to each other in the prescribed fashion. The basis for these statements comes from the following research studies:

1. Formal organizations create serious barriers to effective communication between the organizations and external sources of information (Allen and Bennell, cited in Kaimowitz, 1990).
2. Informal communication often contributes to an organization's effectiveness in reaching its goal, and formal communication is always important in an organization even if the informal channels are functioning adequately (Rogers, 1976).
3. A fairly small number of individuals is responsible for a high proportion of internal and external communication. These "gatekeepers" evolve to fulfill a need the organization itself cannot satisfy (Rogers & Agarwala, 1976).
4. Communication is the key to the innovation process because it involves the sharing of information... about available resources among members of an organization (Rogers & Agarwala, 1976).
5. People communicate most frequently and effectively with those who are most similar to themselves (Roling, 1990).
6. The degree of connectedness in a communications network is positively related to the rate of diffusion of innovations (Rogers, 1983).
7. Informal personal contact is important for all adoption decisions and crucial for later adopters (Havelock, 1986a).
8. "Networks are the invisible routes through which individuals make things happen..., a communication network consists of interconnected individuals who are linked by patterned flows of information." (Rogers, 1983)
9. A link is a communication relationship between two units (usually individuals). The link is the basic datum in any type of network analysis (Rogers & Kincaid, 1981).

Delimitations

The study was delimited to a population consisting of 147 extension agents, 25 researchers, and a sample of 350 farmers from the South West province of Cameroon. The study excluded extension agents who were not under the Ministry of Agriculture and farmers who were not also under the auspices of agents in the Ministry of Agriculture. Information sought with the survey was limited to the activities (technology development, transfer, and adoption) or communication relationships that occurred within the past year (1995). The study was delimited also to data gathered during the spring and summer of 1996.

Limitations

1. This study focused on the quality of information communication linkages between the farmers and the agencies responsible for the diffusion of innovations in Cameroon as perceived by the respondent.
2. The study's focus on communication linkages among the three distinct groups of researchers, extensionists, and farmers does not constitute a complete description of all linkages among the three groups, nor is it suggested that this is the most important problem of the Cameroon agricultural system.
3. This study was originally designed to cover two of the seven provinces of Cameroon, but due to lack of resources that occurred after the researcher arrived Cameroon the data collected and generalizations drawn were limited to the South West Province of Cameroon. Consequently, it will not be possible to generalize to other parts of the nation or to other countries.
4. It was not known the extent to which the farmers on the list provided by provincial and divisional delegates of agriculture in South West Province from which the sample was drawn, was representative of all food-crop farmers in that province.

Assumptions

While certain limitations were recognized as described above, it was also necessary to make certain assumptions in conducting the study. They were:

1. The researcher assumed there was enough contact among the farmers, researchers, and the extensionists so that she could describe accurately the communication linkage among them.
2. The farmers identified for this study were representative of other farmers in the province studied who were not in contact with extension program under the Ministry of Agriculture, because they all cultivate the same crops, experience the same agroclimatic conditions, and are exposed to similar channels of communication.
3. The materials (list of names for the three groups, background information of the country) requested from Cameroon for the purpose of conducting this study were accurate as described.
4. Previous studies conducted on linkages in Cameroon accurately described the nature of linkages that do exist but did not describe the effectiveness of those linkages.
5. The farmers possessed an educational level high enough to respond appropriately, voluntarily, and honestly to the survey instrument.

Setting for the Study:

Geography of South West Province

The South West Province is one of the seven provinces of the Republic of Cameroon. It is located between the Atlantic Ocean in the South, the federal Republic of Nigeria to the West, and the highlands of the North West Province in the East.

This Province is one of the most important agricultural provinces in Cameroon. This is because of the concentration of agricultural products produce, such as, cocoa, coffee, maize, cassava, bananas etc. It covers a total surface area of 24,910 km squared. The vegetation is rainforest; the average annual rainfall is 3,000mm. The soils range from the volcanic type around Mount Cameroon and Mount Kupe through loamy and clay soils, to sandy types. Its population is estimated at 830,509 inhabitants of which 487,602 constitute the rural population with 366,680 active farmers.

South West Province hosts the tallest peak in West Africa (Mount Cameroon, 4100m) and the second rainiest place in the world (Cape Debundsha, 5,000mm annual rainfall). The province is essentially lowlands (86% of habitable land). The farming household density varies from 4.0 farming households per square kilometer in the highlands to 2.5 farming households per square kilometer in the lowlands.

The National Agricultural Extension Training Project (NAETP) launched in 1991 has covered the whole province since 1993. This program carried out many activities during the 1993/94 agricultural campaign with the purpose of improving the production level of farmers. It was undertaken with the financial support of World Bank. Administratively, the Province is divided into six divisions, all of which were covered during the study: Fako, Meme, Manyu, Ndian, Kupe Muanenguba, and Lebialem.

METHODOLOGY

This chapter describes the population studied and how it was identified. It also describes how the data were collected, the methods and procedures that were employed in the design of the study, and the instruments used to collect the data.

It is important to note that a good sample survey, by whatever method, is one in which all members of a population have a known opportunity to be sampled for inclusion in the survey, the people in the survey were selected by random sampling methods in sufficiently large numbers to provide a desired level of precision, questions are selected and phrased in ways that result in people providing accurate information, and everyone included in the sample responds (Dillman 1978, 1983).

Population

Data sought for this study came from three populations namely, researchers, extensionists, and farmers. The researcher population consisted of all 25 cash crop researchers in the South West Province stationed at the Ekona research center. A letter was written to the chief of the center requesting the list of names of all the researchers at the center. A list of names for the researchers at the center was provided and a date was scheduled for the researcher to distribute the questionnaires.

The extensionist population was 150 extensionists, including the delegate, chief of project, subject matter specialists, and village extension workers in the South West Province. The list for all extensionists was obtained at each Divisional Office of Agriculture in the South West Province. Questionnaires were distributed to these groups during a yearly evaluation meeting.

Extensionists from all of the five divisions within the province were in attendance.

The farmer population consisted of those farmers who were in close collaboration with, and were served by the extensionists under the Ministry of Agriculture. A list of all their names was obtained from each Divisional and Sub-divisional Office of Agriculture to reduce the non coverage error. A random sample 307 farmers was selected from the list of

3,000 farmers provided.

Instrument Development

The instruments used in this study were developed according to guidelines provided by Dillman (1978,1983), Salant & Dillman, (1994). Also, the selection of some items for the questionnaire was influenced by the works of Molt (1972) on organizational effectiveness, Enyong (1993) on linkages, and Ewell (1989, p. 154) on aspects to consider when evaluating the effectiveness of linkages. The instruments were finalized with the help of the researcher's advising committee members who are experts in the fields of agricultural education, international agricultural development, and program evaluation.

The instruments were pilot tested in Cameroon using 10 participants for each group under study from South West and North West provinces. There was a 85% response rate and necessary revisions were made to maximize accuracy of the instruments. As stated earlier, the questionnaires were administered only to participants in the South West Province, because of financial constraints that occurred in the field.

A cover letter included a description of the study's usefulness, statements as to why the respondent is important, and how his or her confidentiality would be protected.

The first section of the questionnaire dealt with questions about specific practices in crop production each group has either developed (researcher), transferred (extensionist), or adopted (farmer) within the past year. The second section of the instrument dealt with different sources of information and methods of communication. Participants were asked to "circle all that apply." The third section of the questionnaire asked participants to rate their preference of the different communication models by "circling one number on a scale of 1-5" (the higher the number, the higher the rating) . Participants were also requested to rate the intensity of their attitude towards some assumptions about adult learners by circling a letter on a five-point likert type scale ranging from "strongly agree" or "strongly disagree."

It is important to note that alterations in the wording of questions often change the outcome of surveys (Baumgartner & Walker, 1990). The use of "effectiveness"

"importance" and "preference" as used in the study, is the relative, self-perceived level of efficacy of various communication models, sources, and methods of communication.

The fifth section asked participants to rate the level of effectiveness for the various communication models used within the past year by circling one number on a scale from 1-5 (the higher the number, the higher the rating).

Background information was sought on level of education, goals, language, sex, age, and area of specialty. Copies of the instruments used with each of the three groups are presented in the Appendices.

Data Collection

Questionnaires were distributed to some extensionists and researchers during their yearly evaluation meetings. Twenty questionnaires were completed and collected on the same day. Those who couldn't complete theirs were asked to drop them off at a central location (Divisional offices) at a later date. Those extensionists who did not attend the evaluation meetings were contacted during their fortnightly training meetings. fifteen questionnaires were completed at location and the rest were dropped off later at their various offices.

The researcher went door to door at the research center to collect the remaining ones from researchers who didn't attend the yearly evaluation meeting. Twelve copies were collected and two copies that were not completed were later mailed to the researcher.

Farmers responded to their questionnaires during farm group meetings, market days, and town meetings. Those selected were given ample time to complete answering their surveys. Twenty-five to thirty questionnaires were often collected immediately by the researcher at each location. Farmers who couldn't complete answering their questionnaires were advised to drop them off at the office of the village level extension agent. These were picked up by the researcher later. Although in most cases the researcher, some extensionists, and an interpreter were on hand for clarifications, the survey was administered to allow the respondents to answer the questions individually and

confidentially.

Follow-up reminders were sent to researchers after a week of no response. Several verbal reminders were made at different meetings to extensionists and some farmers who had not completed their questionnaires on location. Additional questionnaires were further distributed to some extensionists and researchers who misplaced their originals. The researcher made several trips to give verbal reminders to those who did not respond after the first two weeks. Respondents were requested to drop their answered questionnaires at a central location. The surveys came in very slowly and bad weather made it difficult to keep appointments. The response was above 50% for all three groups. Researchers had a 90% response rate, followed by 85% response rate for extensionists, and 75% response rate for farmers.

Operational Definitions

The variables utilized to operationalize the causal model were selected on the basis of previous research findings and Cronbach's coefficient alpha. SAS Systems provides many statistics for estimating reliability including Cronbach's coefficient alpha, which is computed in the CORR procedure. Cronbach's coefficient alpha is one of the most widely used reliability statistics. Cronbach's coefficient alpha is used most often when a multiple item summary rating scale has been administered to a randomly selected group of respondents, which is the case in this study. Cronbach's coefficient alpha is used to measure the correlation between the current test and all possible scales or tests with the same number of items that measure the attribute of interest. It is important to note that all items should be positively correlated because they are measuring a common entity. When negative values occur, the items are not positively correlated and the reliability correlation and reliability model is violated. Any items that were negatively correlated were believed not to be correlated with other items in the scale and were dropped from the analysis, because they were not measuring the same construct. Cronbach's coefficient alpha, like the squared correlation coefficient, varies from 0 to 1. The larger the overall alpha coefficient,

the more confident one can be that the items contribute to a reliable scale. Nunnally (1978) suggests .70 as a rule of thumb for accepting the reliability of scales.

Administrative structures, farmer characteristic, communication channel, work relationship, and source characteristics were obtained from previous research studies. Cronbach coefficient alpha, in turn, was used to establish the reliability of communication importance, and communication efficiency. A Cronbach alpha of .70 and higher was determined for all the selected variables.

Administrative structure is measured by two variables, namely Hierarchy, which is the number of individuals that a farmer has to consult with before getting the information he/she requires, and proximity, which is defined as the location of the offices of extension and research.

Communication channels were measured by two variables. The first is print media, which involves the use of newspapers, written training materials, pamphlets and flyers as a channel of communication. The second was group and town meeting which represented meetings held between and among farmers, extension workers, and researchers. Group meeting as defined in this study is an activity usually conducted by the extension workers with farmers. It is assumed both parties have equal participation. Town meeting is a mandatory activity conducted by researchers with farmers. Farmers were asked to indicate which of the two channels they preferred most on a scale of 1 to 5 (the higher the number the higher the preferences).

Work relationship is the interface among those individuals involved in any organization. It was measured by the variable Team and Reciprocal relationship. Team as used in the study is defined as the equal relationship maintained among the three groups in conducting their activities. Meanwhile, reciprocal relationship is defined as a relationship among the three groups, but it doesn't have to be on equal basis.

Source characteristics are also measured by two variables, credibility and organizational goals. Source credibility is the degree to which a communicator

(extensionists, researchers) is perceived as trustworthy and competent by the receiver (farmers). Source goals are the main objectives that the organization set out to attain. Respondents were required to indicate on a scale of 1 to 5 the effect of their different goals on their decision to adopt (the higher the number the higher the effect).

Farmer characteristics were derived from attributes of each respondent for three variables: educational attainment, goals, and language used. Educational attainment, language, and goals were straightforward and required no computations.

Communication importance was operationalized by asking respondents to rate the importance of communication to their decision to adopt new practices on a 5- point scale ranging from 1 (not important) to 5 (very important).

Finally, communication effectiveness, the dependent variable of this study, was operationalized by asking respondents to rate the effectiveness of communication---all things considered --on a 5- point scale ranging from 1 (not effective) to 5 (very effective).

Because the variables were standardized, each variable theoretically contributes a unit variance of 1 to total variance. A Reliability Coefficient, designated beta (0), was calculated on the scores to determine the effectiveness of components as independent variables in subsequent analytical procedures, such as path analysis multiple regression. The Reliability Coefficient is a special case of Cronbach's alpha coefficient (Cronbach, 1951). The result of Cronbach alpha for each variable is presented in the analysis section.

Data Analysis

The results of the questionnaires were tabulated and analyzed using the Statistical Analysis System (SAS) of extension information technology computer program. Frequencies, means, standard deviations, and multivariance statistical methods were used in analyzing the results. An explanation of multi variate statistical analysis is provided to make the interpretation more meaningful to the reader. The .01 level of significance was established when examining data.

Multiple Regression

A technique used in this study is multiple regression. It is a multi variate technique for determining the correlation between a criterion variable and a combination of two or more predictor variables. It also provides estimates both of the magnitude and statistical significance of relationships among variables (Borg & Gall, 1989). This procedure determines the direct effect an independent variable has on communication effectiveness when controlling for all other variables in the regression model.

Path Analysis

Path analysis is a method for testing the validity of a theory about causal relationships among three or more variables that have been studied when using a correlational research design. Using this technique for this particular study enables one to determine both the direct and indirect effect of an independent variable on communication effectiveness.

One assumption of a path model is that the first variable is the direct cause of the second. Therefore, a regression coefficient value of zero in the multiple regression model suggests that the conceived causal relationship did not occur in the population being studied. Thus the first variable is not a direct cause of the second.

Path analysis consists basically of three steps. First, formulate a theory linking the variables of interest. Second, develop or select measures of the variables. Third, compute the statistics (path coefficients) that show the strength of relationship between each of the pairs that are causally linked in the theory. It is important to note that path analysis provides a better basis for examining causal relationships in correlational data than other methods, even though some of the other methods are simpler to apply (Borg & Gall, 1989).

FINDINGS AND DISCUSSION

The overall purpose of this study was to examine the quality of communication linkages between the farmers and agricultural agencies (extensionists and researchers) responsible for the diffusion of innovation in the South West of Cameroon. The research questions developed to accomplish this purpose were as follows:

1. How effective is the communication linkage in promoting the rapid adoption of innovations as perceived by the three groups under study?
2. How often are the existing communication links used as perceived by the researchers, extensionists, and farmers?
3. What are the personal and background experiences or charateristics of the three groups under study?
4. Are there significant differences in the perception of the three groups towards the effectiveness of communication linkages in the diffusion of innovations?
5. What is the current pattern of communication linkages among the farmers, extensionists, and researchers as perceived by members of each of the three groups?
6. What do the farmers, extensionists, and researchers from the South West Province perceive the effectiveness of existing communication models to be?
7. What are the perception of farmers, extensionists, and researchers of South West Province toward adult learners principles?

Presented below are summarized findings as they relate to the research questions. For detailed findings the reader is advised to see the full dissertation.

Findings Related to Research Question One

To answer question one, 82% of farmers adopted food-crops transferred to them for that year.

Findings Related to Research Question Two

Farmers and extensionists reported the level of interaction among the three groups slightly higher than the researchers. However, all groups perceived a moderate level of interaction among the three groups.

Findings Related to Research Question Three

The three groups reported fairly moderate level of education. 69 percent indicated increasing income as one of their primary goals for getting involve in agriculture.

All the three groups had a common goal that encourages the adoption of practices.

Findings Related to Research Question Four

To answer question four, farmers rated credibility the highest with a mean of 4.2, while the extensionists and researchers rated organizational goals highest with means of 4.3 and 4.5 respectively.

Findings Related to Research Question Five

The traditional hierarchical model was ranked highest by the three groups as the existing communication model in South West Province of Cameroon.

Findings Related to Research Question Six

Farmers rated the extensionists highest in communication effectiveness. However, researchers rated the effectiveness of their communication with farmers the highest.

Findings Related to Research Question Seven

The most important principle for all three groups was working on immediate problems.

The final objective of this study was to examine the impact of selected factors on communication effectiveness. Based on the literature reviewed for this and other studies, it is postulated that communication effectiveness between and among farmers, extensionists, and researchers is affected by four general factors. These includes their personal characteristics, characteristics of their respective organizations, and their perception towards different aspects of communication effectiveness. A diagram illustrating the impact of these factors on communication effectiveness is presented in Figure 1.

Also, to measure the factors identified by farmers that influenced communication effectiveness, the SAS procedure of Reliability and literature review was used to determine the internal consistency of the constructs (see Table 1).

Table1. Mean score, reliability coefficients for composite scales and percentage distribution used in measuring factors affecting communication effectiveness as perceived by farmers in the South West Province of Cameroon (1996).

Scales	Mean Score	Cronbrachs' Alpha
Communication Effectiveness	3.0	.91
Communication Importance	3.2	.79
Teamwork	3.0	.75
Proximity	3.3	.84
Hierarchy	3.3	.76
Print Media	2.1	.73
Town Meeting	2.5	One item Measure
Group Meeting	3.0	One item Measure
Organizational goals	3.0	.73
Credibility	3.0	.72

Path Analysis

A product moment correlation matrix was computed for all the variables in the model to determine the size of their association and is presented in Table 2. An inspection of the correlation coefficients among the independent variables revealed that none of the correlations are extremely large and may be retained in the model.

The impact of each variables listed in the correlation matrix of Table 2 is illustrated by the path models that will be presented below. For a detail information of all the path coefficients found to be statistically significant in this study the reader should see Figure 8 and 9 in the dissertation.

Presented in Figure 2, is a more simplified model which revealed that the most determinant having the largest impact on farmers' rating of communication effectiveness was the value of team work with a path coefficient of .269.

This was followed by extension group meeting with a positive score of .225. As stated in the dissertation reducing complexity of the model was not accompanied by much loss of information. Collectively, all variables in the model accounted for 26 percent of variation in farmers' rating of communication effectiveness.

The next was Figure 3 which reflects the regression coefficients of team work on proximity, hierarchy, language, and education. An inspection of individual path coefficients indicate that proximity and hierarchy were both positively related to team, while education and language were negatively related to the dependent variable. Collectively, the variables in the model accounted for 25 percent of the variation in the interest with working in a team.

Figure 4 portrays the regression for extension group meeting on proximity and education. Combined, the variables accounted for three percent of the variation in extension group meeting.

Figure 5 contains the test of significant and the path coefficients for research town meeting on proximity and education. Both variables accounted for three percent of the variation in the interest with research group meeting.

Figure 6 portrays the analyzed effect of communication importance on credibility, education, and language. Credibility was positively related to communication importance. A positive relationship means that as an increase in source credibility occurs, so will the value of communication importance.

Figure 7 presents the results of the test of significance and path coefficients for the path model using credibility as the dependent variable. Combined, the variables explained about three percent of the variation in credibility.

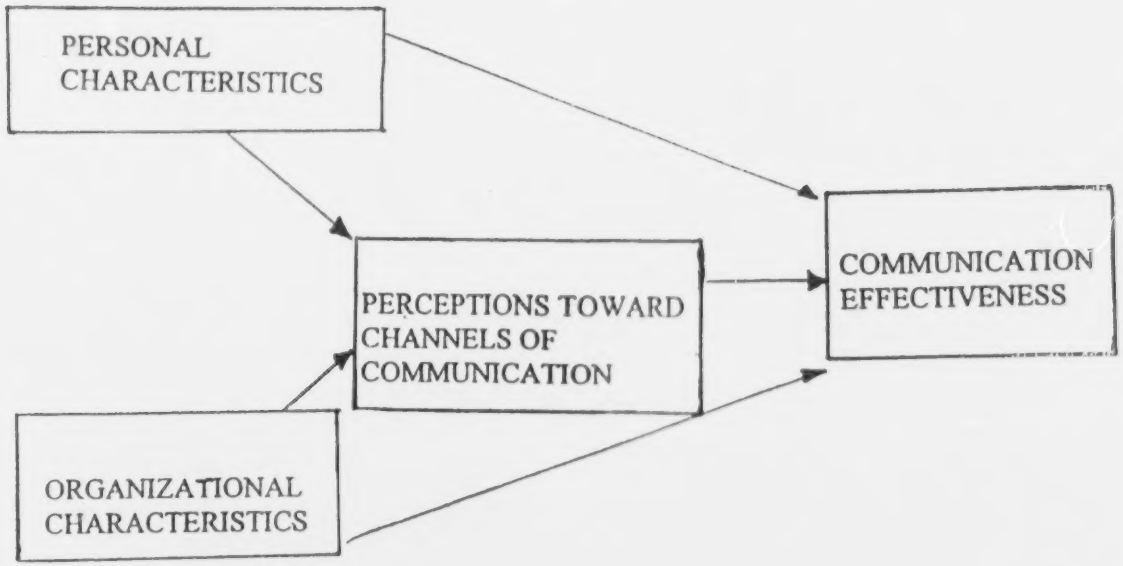

Figure 1. Factors Affecting Communication Effectiveness

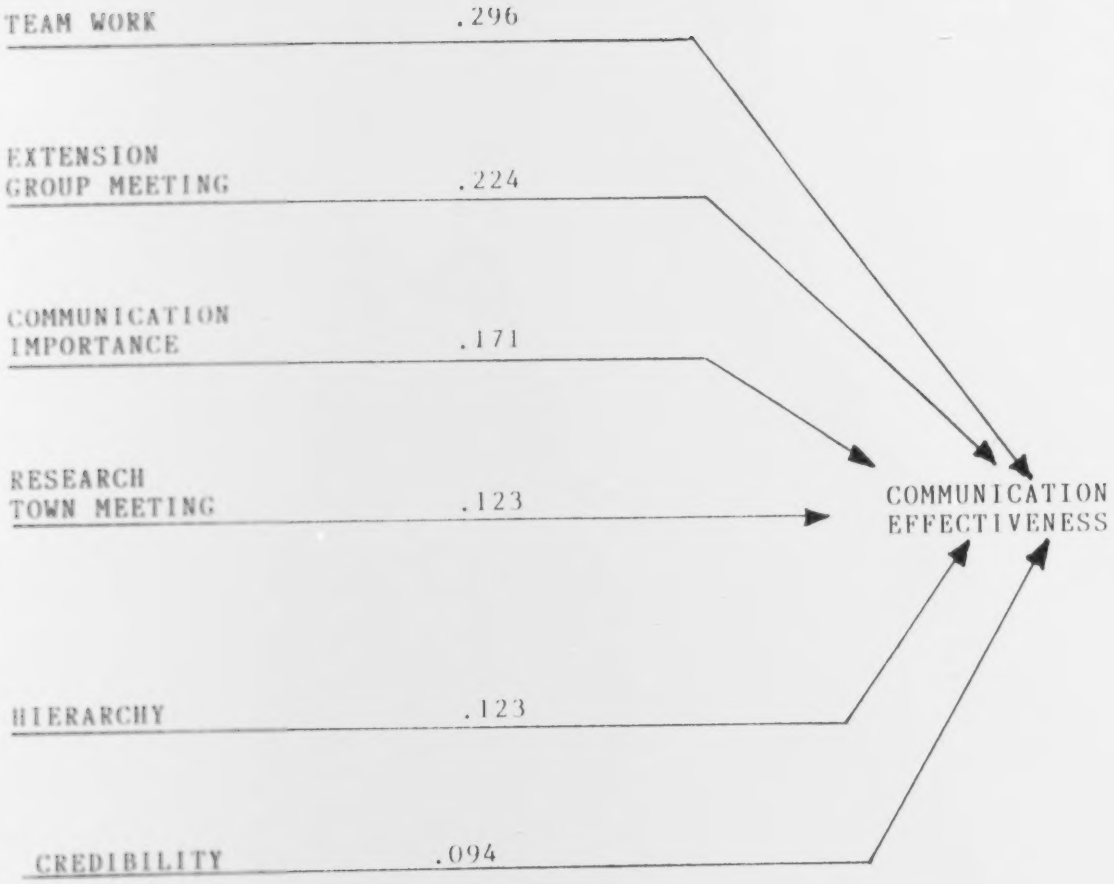

FIGURE 2.

r^2 17.33 f value .26

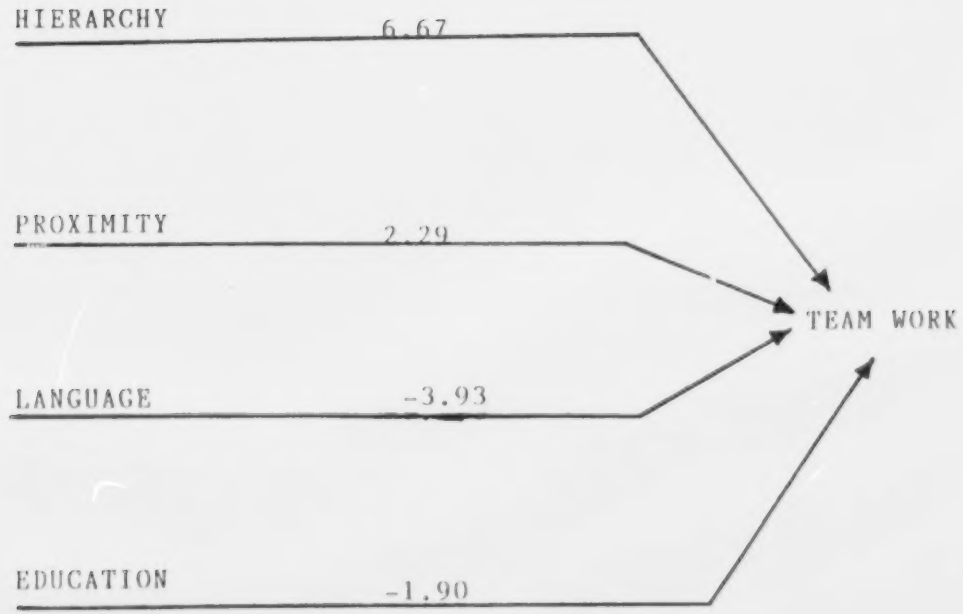

FIGURE 3

r^2 .25

F Value 25.0

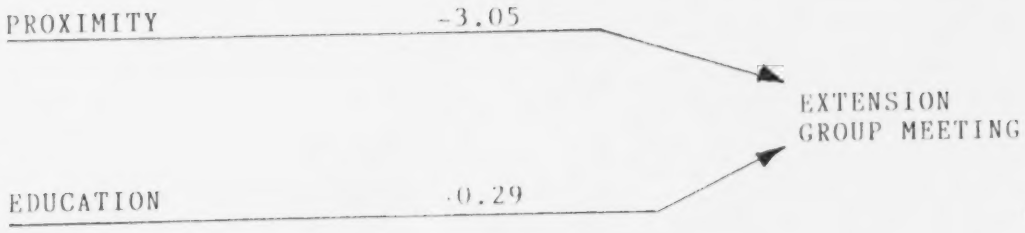

FIGURE 4. r^2 .03 f value 4.79

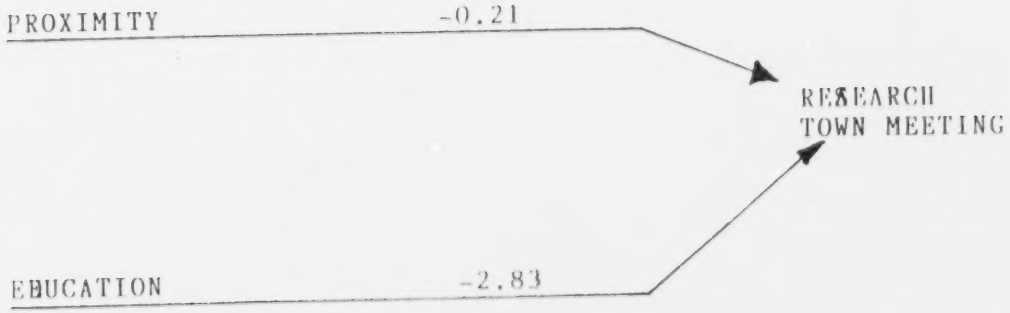

FIGURE 5. r^2 .03 f value 4.0

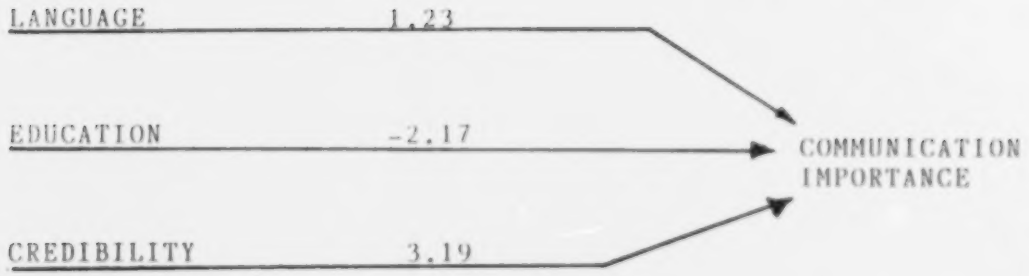

FIGURE 6 r^2 .08 f value 8.35

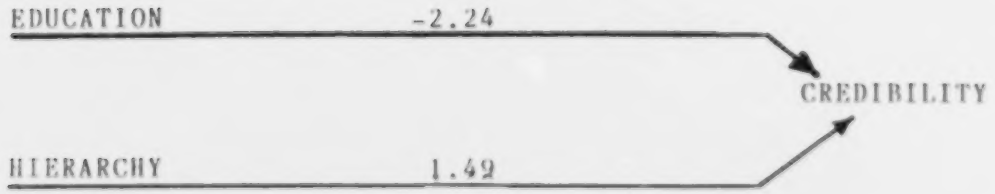

FIGURE 7. r^2 .03 f value 3.98

Conclusion

This study was conducted to measure the effects of selected variables on communication effectiveness. Descriptive statistics, multi variate measurements, and causal techniques have been utilized to achieved the stated objectives. Descriptive statistics revealed that the three groups had some interaction between them. Also, it was found that 82 percent of farmers adopted practices transferred to them during 1996, indicating that, in response to research question one, the communication linkage was effective in promoting the rapid adoption of food crop innovations in South West Province. Evidence from the causal analysis indicated that the variable, team work, had the greatest impact on communication effectiveness. If a rating of 3.00 and above could be accepted as average or above, then communication among the three groups could be concluded to be effective.

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study summarized below was to measure the quality of communication linkages among 385 farmers, 25 researchers, and 150 extensionists, associated with the Ministry of agriculture in the South West Province of Cameroon. Field data were collected in 1996 after field testing the instrument used.

Summary

Improving linkages between farmers and the agencies involved in the diffusion of agricultural practices has been established as a prerequisite to the effectiveness of research. However, many of the evaluation reports and academic studies conducted in individual countries on communication as well as other linkages have been general or anecdotal. Many researchers caution that the problems of weak or ineffective linkages in each situation should be examined from a system perspective and should be situation specific. Also, among the research examined by this study, none was conducted on a specific linkage among farmer and agricultural agencies in a given country. One major objective of this study was to measure the quality of communication linkages between the farmers and the agricultural agencies responsible for the diffusion of innovation in the South West Province of Cameroon. The second major objective of this study was to determine the factors affecting communication effectiveness. Five other objectives were also developed to accomplished the purpose of the study.

Findings

This study addressed seven research questions. A summary to each question is provided below. How effective is the communication linkage in promoting the rapid adoption of innovations as perceived by the three groups? Descriptive statistics were used to determine the type of agricultural practices that were adopted by the food crop farmers. Data revealed that crop variety and different educational skills (planting and harvesting techniques) were the two most often adopted. Thirteen percent of the farmers reported

using pesticides and three percent used insecticides. Less than three percent of the farmers stated they did not use any of the practices.

Data revealed that farmers considered mutual trust between them and the information source the most important reason for adopting the crops recommended by the agricultural agencies. These were followed by farmers' need for the crop and the frequency of communications with the information source. Involvement in committees was the least important reason for adopting the preferred crops for that year.

Descriptive statistics also were used to determine the preferred sources of communication used by researchers, extensionists, and farmers. Sixty three percent of farmers rated the extensionists as their preferred source of information. Extensionists were divided in their preferred sources of information. About one third preferred other extensionists while about one quarter preferred a combination of farmers, extensionists and researchers. Over 60 percent of researchers looked to farmers as their preferred source of information. Less than 2 percent of farmers and extensionists looked to non governmental organization (NGO's) as their preferred source of information. No researcher listed NGOs as a preferred source.

1. The three groups were asked to rate the importance of selected communication channels for exchanging information. Data revealed farm demonstrations were ranked as the most preferred communication channel by the three groups. Next in importance for farmers were the T&V system and joint meetings between extensionists and farmers. Extensionists also found T&V to be second in importance while researchers found joint meetings of the three groups to be second in importance as a communication channel for exchanging information. Newspapers and radios were rated lowest by all three groups. To answer research question one, based on the above findings, one could conclude that communication was effective among the three groups.

2. How often are the existing communication links used as perceived by researchers, extensionists, and farmer? Descriptive statistics were used to determine the

level of interaction among the three groups during the diffusion process. Farmers and extensionists reported the level of interaction among the three groups slightly higher than did researchers. To answer research question two, based on the findings it could be concluded that all the three groups perceived a moderate level of interaction among the three groups.

3. What are the personal and background experiences or characteristics of the three groups under study? Descriptive statistics were used to determine the level of education of the three groups. Data revealed that nearly one-half of farmers have completed primary education, while 6 percent indicated the university and beyond as their highest level. About 11 percent of farmers had attained no formal education. Twenty-seven percent of extensionists reported they were high school graduates and 23 percent were graduates from the university or beyond. All researchers indicated they were university graduates and beyond.

Descriptive statistics were used to determine what were farmers primary goals for getting involved in agriculture. The results revealed 69 percent of farmers rated increasing their incomes as the highest goal. Less than ten percent of farmers indicated getting involved in agriculture for security or social status as a primary goal. Extensionists and researchers were asked to indicate the primary goals of their various organization. Ninety percent of extensionists and 52 percent of researchers rated ensuring the adoption of technology as the highest goals of their organizations. However, 48 percent of researchers stated the main goal of their organization was to develop new technology. Based on the findings it could be concluded that majority of the respondents had an educational level above elementary education. Also, a fairly equal number of extensionists and researchers perceived ensuring the adoption of technology as the primary goal of their organizations.

4. Are there significant differences in the perceptions of the three groups toward factors affecting or promoting the effectiveness in use of existing communication linkages in the diffusion of innovations? Descriptive statistics were further used to report

factors that affect communication among the three groups. Farmers rated credibility the highest, while the extensionists and researchers rated organizational goals highest. Farmers in turn, ranked organizational goals the lowest. Extensionists and researchers ranked proximity the lowest. From the above findings one could conclude that farmers perceived factors that affect communication linkages differently from both researchers and extensionists.

5. What is the current pattern of communication linkages among the farmers, extensionists, and researchers as perceived by members of each of the three groups? Descriptive statistics were used to determine the pattern of communication among three groups. Data revealed the traditional hierarchical model was ranked highest by all three groups. Extensionists and researchers reported percentages of 33.6 and 46.5 respectively. While 69 percent of farmers indicated the hierarchical model was the existing model used by the three groups to exchange information with each other in South West Province.

All three groups indicated having used at one time three of the other models. It is ironic that both extensionists and researchers indicated they used the participatory model and the farmers indicated otherwise. The investigator was surprised to learn that more than 16 percent of farmers were not clear on the existing communication model. It could be concluded from the above findings that, the existing communication model as perceived by the three groups is the hierarchical model.

6. What do farmers, extensionists, and researchers from South West Province perceive the effectiveness of existing communication model to be? Descriptive statistics were used to report the perception of the three groups of the effectiveness of the communication model they chose. Farmers rated the extensionists highest in communication effectiveness, extensionists rated the communication effectiveness highest with other extensionists and lowest with researchers. Researchers rated the effectiveness of their communication with farmers the highest and their communication effectiveness with extensionists slightly lower. To answer research question six, one could conclude

from the above findings that the three groups perceived the effectiveness of the communication model differently.

7. What are the perceptions of researchers, extensionists, and farmers of South West Province toward some principles of education for adult learners? Descriptive statistics were used to analyze the perceptions of the three groups on some principles of adult learning. Results revealed the most important principle for all three groups was working on the immediate problem. Farmers also rated active participation on activities concerning them as equally important to addressing their immediate problem. Interestingly, researchers rated active participation as the least important principle. Both extensionists and farmers rated proper lighting, and sitting arrangements (conducive environment) as the least important principle.

Implications of Descriptive Analysis

Because this study was confined to one of the ten provinces of Cameroon, sweeping implications for all the farmers in other provinces cannot be made. However, because it was assumed that the sample used from which to draw the data was representative of the farmers in South West Province, implications may be regarded valid for this province. The following implications are based on the findings and conclusions evolving from this study.

1. In the descriptive data collected from the farmers in 1996, it is noted that 82.2 percent adopted two of the practices transferred to them in that year. It is possible that farmers who did not adopt any of the practices had less interaction with the source of the practice. Some mentioned that the researcher or extensionists "did not come back after the field demonstration." This implied that more visits or other means of communication has to be made to increase adoption with that group of farmers. Although data analysis revealed communication was effective among the three groups in South West Province, it could imply that farmers adopted the practices transferred to them because they wanted to increase their income, which was indicated as their primary goal, and not because of

effective communication.

2. The analysis of data revealed that the three groups interacted with each other; what is not known is whether they interacted before, during, or after the diffusion process. Also, it is possible that the three groups interacted because they were required to do so. Because it is an important question to be answered, more research in this area is needed. If 3.00 an above average can be accepted as high, then the three groups' interaction with each other was effective.

3. Data revealed that a vast majority of farmers that responded cited source credibility as the factor that most affected communication between farmer and agricultural agencies. This is in conformity with past research which implies the experts' knowledge level about a subject matter and trustworthiness with which a source is viewed by farmers will influence their adoption. On the other hand, the extensionists and researchers rated organizational goals the highest. This would imply that their different organizational goals make it difficult for them to work together. It would be beneficial to the well being of the organization if the two groups have a unifying goal, since they both serve the same clients.

It is important to note that all the three groups ranked hierarchy as the third factor that affects adoption. The reader should be informed that majority of the respondents from the three groups did not understand the administrative structure of the organization, by saying " I don't know who to channel my report to." It is important for policy makers to expose the chain of command or administrative structure to those below them in other to eliminate the confusion faced by extensionists and farmers.

4. The analysis of data showed that the hierarchical model was ranked highest as the existing model used to exchange information among the three groups. This would imply that whatever the top level administration communicates to the lower level administration, it is accepted and enforced. Because of the farmers being used to this system, it is not surprising that a vast majority of the farmers adopted the practice handed down to them. On the other hand, both extensionists and researchers reported to having

used the participatory model during the same period of diffusion of innovation. Much is not known if using the participatory model had a big part to play with the level of adoption. Therefore, more research with respect to both models might be needed, particularly because previous researchers (Rogers, 1983) have reported that farmers often discontinue a practice if they do not receive continued support for the practice.

5. Data revealed that all the three groups rated the importance of some adult learners' principles fairly equally. Whether it is because it is something already in practice or needs to be included is not known. However, it is important to note that farmers and extensionists believed that adults learn best when they have immediate problems and there was active participation. While researchers believed adults learn best when the environment is conducive and the content is meaningful. In view of the fact that understanding some principles of adult learners has an important bearing on communication effectiveness among the three groups prove it is an important variable to be investigated.

6. The respondents were requested to indicate the source of the practice they adopted, transferred and developed. Farmers and other extensionists indicated their source of information to be extensionists. However, a vast majority of researchers used farmers as their source of information to develop the practice. This would imply that not only the hierarchical model is used to exchange information among the three groups, but also that some researchers and extensionists use the participatory model at times with farmers. Whether this is beneficial to the goals of the organization is not known.

7. Data revealed that a majority of farmers ranked the need for a particular practice as the most important reason for adopting a practice. This would imply that those responsible or involved with decisions about practices should make sure whatever is transferred to farmers correspond with what they need. This could only be achieved if farmers are involved in needs assessment meetings as they all indicated in the results of the descriptive statistics.

8. The three groups reported having used a variety of communication channels

during the year under investigation. However, an analysis of data revealed field demonstrations was the channel most preferred by the three groups. This would imply practice demonstrated are more likely to be adopted than are practices not demonstrated. In view of the fact that farmers indicated active participation and working on an immediate problem as two important reason for adult learners to learn, it would imply more activities with farmers involvement, including demonstrations should be promoted among the three groups. Also, in service training on demonstration should be provided for extensionists and researchers.

Summary and Implications Related to Objective Four

A second major objective of this study was to determine the magnitude of the direct and indirect effects of different factors on communication effectiveness. Most of the variables analyzed were selected on the basis of previous research findings and composite scales created for this study were tested using SAS Cronbach reliability procedure. Communication effectiveness, the dependent variable for this study, was operationally defined as the ease, frequency, and timeliness with which an idea is received and utilized by the intended receiver. A casual model of communication effectiveness was formulated as a guide to determine the magnitude of the direct and indirect effects of the selected variables on communication efficiency.

It was proposed that communication effectiveness represents an individual's adaptation or utilization of new or improved ideas to their environment. The model depicts communication effectiveness as being influenced by hierarchy, source credibility, team work, education, language, communication importance, group and town meetings. Communication channels in turn, are influenced by hierarchy, team work, source credibility, education, and language. Team work is influenced by source credibility, hierarchy, education, and language. Source credibility, in turn, is influenced by team work, town and group meetings, and communication effectiveness.

Construction of a causal model depends upon several factors including the existence of a significant relationship between relevant variables. Thus, if the first variable is the direct cause of the second, variable there must exist a statistically significant relationship between the two variables.

Path analysis was employed to established the level of significance of the proposed relationships presented in the causal model.

An analysis of the results pertaining to the causal model disclosed:

1. Participation in a team had more influence on communication effectiveness.
2. Town meetings conducted by researchers were not significantly related to communication effectiveness.
3. Group meeting conducted by extension accounted for approximately 23 percent of the variation in communication effectiveness.
4. Communication importance was significantly related to communication efficiency accounting for 17 percent of the variation in communication effectiveness.
5. As the source credibility coefficient increased, communication efficiency also increased.
6. Hierarchy was significantly related to communication effectiveness contributing 12 percent of the variation in communication effectiveness.
7. Hierarchy was not significantly related to credibility. The more frequent the factor of hierarchy appeared, the more credible was the source of information.
8. As one's level of education decreases, the credibility of the source of information increases.
9. Education was not significantly related to the value of teams.
10. Proximity, hierarchy, and language coefficient accounted for about 24 percent of the variation in team importance.
11. As one's proximity towards another person increases, the greater the interest in participating in a team.

12. Education was not significantly related to group meeting, but it accounted for 16 percent of the variation in the value of group meetings.
13. Proximity and education coefficients were not significantly related to town meeting.
14. Credibility and education were significantly related to communication importance.
15. A decrease in the level of education will increase one's value for communication importance.

Because some of the proposed relationships were found to be nonsignificant, the relationships with near-zero coefficients were eliminated. This reduced considerably the complexity of the model as originally formulated and resulted in a more explanatory model being formulated to determine the direct and indirect effects of selected variables on communication efficiency.

The reconstructed model depicts communication efficiency as being dependent upon communication importance, team, group meeting, town meeting, credibility, proximity, and hierarchy. Communication importance, in turn, depends upon credibility, language, and education. Team work depends on proximity, hierarchy, language, and education. Meanwhile, credibility depends on hierarchy, and education. The value of group meetings, in turn, depends on proximity and education. Finally, the value of town meetings depends also upon proximity and education.

On the basis of this model, the coefficients were re-estimated and the direct and indirect effects of communication effectiveness were determined. An analysis of the data indicated that elimination of variables had little effects on the explanatory power of the model when compared to the complex model. Team, communication importance, hierarchy, group meeting, town meeting, and credibility accounted for approximately 26 percent of variation in communication effectiveness. This compares to the more complex model which

accounted 29 percent of the variation in communication effectiveness.

The most immediate determinant of communication effectiveness was team work with a positive path coefficient of .269, followed by group meeting with a coefficient of .225. Hierarchy and town meetings had the same path coefficients of .123. Finally, communication importance and credibility both had a coefficient of .171 and .094 respectively.

Additional Implications

As discussed in Chapter II, Molt (1972) and Webster (1989) measured communication effectiveness as the degree to which output goals are achieved. The findings for this study have implications for factors that affect communication efficiency as it relates to the farmers adopting the practice transferred to them.

One implication concerns those involved with diffusion process working together as a team. Kaimowitz et al., (1990) proposed that linkages that give farmers, extensionists, and researchers opportunities for input or feedback early on in technology development are necessary for the production of relevant technologies.

An analysis of data revealed that team work was significantly related to communication effectiveness at a .01 level of significance. This would imply that policy makers should encourage or adopt strategies that allow those involved with the diffusion process to engage in some kind of relationship. A high level of coordination, collaboration, and communication as a team enhances the chances for research to be adapted to the users' environment. For example, encourage the three parties to recognize their interindependence and mutual competence such that neither perceives the other as a threat to achieving its objectives.

Further, the findings revealed team work is influenced by proximity and hierarchy. This could imply that in order to improve team work, policy makers have to adopt strategies that would encourage communication within the hierarchy and choose activities that could reduce the gap among the three groups. In other words, communication strategies should

be established both at regional or district levels. As stated in Chapter II, an organizational structure that allows for a "bottom up" communication flow, in which top management program decisions are based on information from field workers and farmers, leads to a more viable and effective Extension programs.

It may be recalled that Rogers (1983) theorized that the extent to which a source is perceived as competent and believable by a receiver would influence his or her change of attitude to the desired directions. This study found that level of education was negatively related to credibility. This would imply that as one's level of education decreases, his or her credibility as perceived by the farmer increases.

The investigator experienced this in the field with many farmers who knew her level of education. But when she became involved with their daily activities and spoke their dialect the various groups became more receptive to her contributions. Mechanisms should be established that could involve all participants working together to ease the educational myth. Diffusion is defined by many as the process by which an innovation is communicated through certain channels to member of a social system. The findings of this study revealed that a town meeting conducted by researchers as carried out in Cameroon, was not significantly related to communication efficiency. On the other hand, a group meeting conducted by the extensionists was significantly related to communication efficiency.

This implies that more funding or emphasis should be put on group meetings conducted by extensionists as opposed to town meetings as organized in Cameroon. This does not imply town meetings are not necessary or important. As a communication channel, town meetings should be used in relation to the message and intended receivers. It should be noted that both town and group meetings are channels of communication used to exchange information among the three groups. Therefore, the preference indicated by the farmers does not imply one meeting is superior to the other but that it was an activity that could be

organized interchangeably at appropriate times.

As stated in the previous paragraph, proximity and hierarchy were significantly related to team. This could also imply that as one's location towards another becomes closer, the more interested they will be toward working in a team. The investigator found out while conducting the study that the farmers' location via the agencies involved in the diffusion of agricultural innovations did not encourage team work.

More attention should be allocated in ensuring that the main offices are accessible to farmers who need to verify their information with someone other than their village worker. Hierarchy was significantly related to team work. This could imply people who work in a more structured environment will be more willing to work together. This finding does not conform with past findings which attribute the difficulties of coordination among the three groups to hierarchical models used in most third world countries.

With hierarchy and proximity significantly related to team at a .01 level, policy makers should examine linkage mechanisms that could reduce the effects of the two factors on team. It is important to note that South Korea was cited as one of the countries with an effective hierarchical system. Hence, if appropriate linkage mechanisms are used, effective communication could be achieved among the three groups in South West Province of Cameroon.

Hierarchy was found to be significantly related to credibility. This could imply that as the gap among those working towards the same goal reduces, the chances increase of those at lower levels in the hierarchy perceiving those above them in hierarchy as being increases. As stated earlier, most farmers that responded indicated credibility of source as one the factors they consider when adopting any practice. Therefore, policy makers should involve farmers at all phases of planning, development, and implementation of programs to increase credibility and eventually increase adoption. It is important for policy makers to further adopt mechanisms that could reward work performance and credibility. For example, reward creativity, provide proper working conditions, and provide motivation for staff

rotation.

Finally, communication importance was found significantly related to communication effectiveness. This would imply the more value individuals placed on communication the chances will increase of achieving communication effectiveness. Farmers and extension workers should be allowed or encouraged to express their ideas and share their experiences on the field with researchers during all meetings. Subject-matter specialists should not be punished for exposing farmers' problems in their evaluation reports. Instead, they should be rewarded for work performance and their recommendations enforced. As stated earlier, the more aware farmers and extensionists are of the importance of communication, the greater are the chances to achieve communication effectiveness.

Concluding Statement

To improve agricultural development, policy makers must promote institutional changes that facilitate interaction between research extension agencies and support farmers' participation in technology development and diffusion efforts. All those involved, including policy makers, should be educated about the potential benefits that research can contribute to agricultural development. To do otherwise would be creating practices that are not compatible with farmer needs, could result in waste, and eventually affect agricultural development negatively. As noted in the literature review, linkage combines the notions of a communication network and a problem-solving system. Hence, adequate functioning of the total system requires a series of linkages among critical subsystems. In summary, the purpose of this study was to measure the quality of communication linkages among researchers, extensionists, and farmers in South West Province in Cameroon. To achieve this goal, some objectives were developed to guide the investigator. The findings of the study revealed that a majority of farmers adopted the practices transferred to them for that year. The three groups also indicated a moderate level of interaction with each other. Also, team work was found to have a significant influence on communication effectiveness. It is

therefore important for policy makers to adopt strategies that could help sustain the level of adoption indicated by farmers. For example, expose the benefits of communication to researchers and extensionists, encourage farmer participation in different team work activities, include farmers in meetings to formulation goals for research and extension efforts, and reward credibility at all levels.

Recommendations for Action

Based on the findings, conclusions, and implications arising from this study, the following recommendations for action are put forth.

1. The administrative structure of the organization should be defined and made available to those involved.
2. Farmers' should be included in the planning, development, and implementation of decisions affecting them.
3. More training sessions on what to communicate to farmers should be encouraged. Opportunity to attend training activities should be open to all extensionists and not just to a selected few.
4. Strategies to improve communication linkages should be drawn from the preferred methods of communication that the three groups have indicated in the study.
5. The potential benefits of communication linkages should be made available to all involved with the system.
6. Workers complained of lack of resources (petrol, training materials, bikes) as a reason for low productivity. While this finding was not part of the study undertaken, because it was so prevalent, it is recommended that emphasis should be placed on the accountability of the available resources and fair distribution of these resources.

Recommendations for Future Research

The recommendations made in the section above arose from the study reported. However, because this was the first study undertaken in South West Province of Cameroon that examined some of the factors reported, and because the researcher was limited in time, funds, and resources, the following recommendations are made for further research related to communication linkages, especially in Cameroon.

1. The same study should be conducted in the other provinces in the country to see if the same results are achieved.
2. The hierarchical model should be tested and the key factors affecting its effectiveness analyzed because its the communication model identified by researchers, extensionists, and farmers as existing in the South West Province of Cameroon.
3. Linkages existing among groups associated with other organizations should be investigated to find out if the same factors revealed by this study also affect their effectiveness.
4. A study should be conducted to measure the frequency and regularity with which communication among the groups occur and whether the exchange that takes place was two-way or one-way.

REFERENCES

Academy for Educational Development. (1986). Clearing House on Development Communication, Special Report No. 55. Washington, DC: AED.

Allen, T.J. & Bennell, P. (1990). Intergroup relationship in institutional agricultural technology systems. In D. Kaimowitz (Ed.), Making the link: Agricultural research and technology transfer in Developing countries (pp. 109-149). Boulder, CO: Westview Press.

Arnon, I. (1989). Agricultural research and technology transfer. New York: Elsevier Science Publishing Co., Inc.

Asher, H. B. (1976). Causal Modeling. Beverly Hills, CA: Sage Publications.

Axinn, G. H. (1988). Guide in alternative extension approaches. Rome: Food and Agriculture Organization of the United Nations.

Axinn, G.H. & Thorat, S. (1972). Modernizing world agriculture: A comparative study of agricultural extension education system. New York: Praeger.

Baharsjah, S. (1985). Improving research-extension linkages: the Indonesian experience. In Cernea M.M., Coulter, J.K., Russell, J.F.A. (Eds) Research extension farmer: A two-way continuum for agricultural development. Washington, DC: World Bank.

Beal, G. (1989). Why the land grant model has failed. In Rivera and Gustafson (Eds.), Agricultural extension: Worldwide institutional evolution and forces for change. New York: Elsevier.

Beal, G.M., Dissanayake, W. & Konshima, S. (1986). Knowledge generation, exchange, and utilization. Boulder, CO: Westview Press.

Bennell, P. (1990). Intergroup relations in institutional agricultural technology systems. In D. Kaimowitz (ED.), Making the link: Agricultural research and technology transfer in developing countries (pp.109-150). Boulder, CO: Westview Press.

Benor, F. & Harrison, J.Q. (1977). Agricultural extension: The training and visit system. Washington, DC: World Bank.

Benor, F., Harrison, J.Q., & Baxter, M. (1984). Agricultural extension: The training and visit system. Washington, DC: World Bank.

Berlo, D. (1960). The Process of communication. New York: Holt, Rinehart and Winston.

Bernard, W. (1993). Communication, technology, and development of people. New York: Routledge.

Bieger, G. R. & Gerlach, G. J. (1996). Educational research: A practical approach. Albany, NY: Delmar.

Blackburn, D. J. (1989). Foundations and changing practices in extension. Guelph, Ontario, Canada: University of Guelph.

Blanckenburg, P. (1984). Agricultural extension in some African and Asian countries: An analysis of countries' reports. Rome: FAO.

Blok, K. & Seegers, S. (1988). The research-extension linkage in the southern region of Sri Lanka: An agricultural information perspective. Unpublished master's thesis, Wageningen Agricultural University, Wageningen, The Netherlands.

Borg, W. & Gall, M. (1989). Educational research (5th Ed.). New York: Longman.

Bracewell, E.W., Perons, E.A., Lakjaa, A. & Chen, C. (1992). A study of adoption and non-adoption of approved practices by Minnesota dairy farm operators. St. Paul: University of Minnesota.

Brookfield, Stephen D (1986). Understanding and facilitating adult learning. San Francisco: Jossey-Bass.

Caffarella, R. S. (1994). Planning programs for adult learners: A practical guide for educators, trainers, and staff developers. San Francisco: Jossey-Bass.

Cernea, M.M., Coulter, J.K., & Russell, J.F.A. (1985). Building the research-extension-farmer-continuum. In M. M. Cernea, J. K. Coulter, & J. F. A. Russell (Eds.), Research-extension-farmer: A two-way continuum for agricultural development (pp. 3-10). Washington, DC: World Bank.

Cernea, M.M., Coulter, J.K., & Russell, J.F.A. (1983). Agricultural extension by training and visit: The Asian experience. Washington, DC: World Bank.

Chakrabarti, A. K., Feineman, S. & Fuentevilla, W. (1983). Characteristics of sources, channels and contents for scientific and technical information systems in R & D. In Charles, D. & Howells, J. (Eds.), Technology transfer in Europe. New York: Belhaven Press.

Chamala, S. (1981). Differential source-utilization patterns: At awareness stages in progressive and non-progressive villages in India. In B.R. Crouch & S. Chamala (Eds.), Extension education and rural development, volume 1. International experience in communication and innovation. New York: John Wiley & Sons

Chambers, R., Pacey, A. & Thrupp, L. (1989). Farmer first: Farmer innovation and agricultural research. London: Intermediate Technology Publications.

Charles, D. & Howells, J. (1992). Technology transfer in Europe: Public and private networks. New York: Belvan Press.

Chu, C. Godwin., Rahim, A. S. & Kincaid, D. L. (1978). Institutional exploration in communication technology. Honolulu, HA: East-West Center.

Crawford, P. (1982). AID experience in agricultural research: A review of project evaluations (AID Program Evaluation Discussion Paper No. 13). Washington, DC: United States Agency for International development.

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika 16:297-334.

Courtney, S. (1991). Why adults learn: Towards a theory of participation in adult education. New York: Routledge.

Crouch, B. & Chamala, S. (Eds) (1981). Extension, education and rural development.

Vol 1. International experience in communication and innovation: Vol 2. International experience in strategies for planned changes. Chichester, England: John Wiley.

Delancy, M. W. (1989). Cameroon: Dependence and independence. Boulder, CO: Westview Press, Inc.

Dillman, D. A. (1983). Mail and self-administered surveys. In P.H. Rossi, J. D. Wright & A. B. Anderson (Eds.), Handbook of survey research (pp. 359-77). New York: Wiley & Sons.

Dillman, D. A. (1978). Mail and telephone surveys: The total design method. New York: Wiley & Sons.

Egan, . (1986). The skilled helper: The systematic approach to effective helping. (3rd ed.). Monterey.

Ekpere, J. & Idowu, I. (1990). Managing the links between research and technology transfer: The case of the agricultural extension-research liaison in Nigeria (ISNAR Linkages Discussion Paper No. 6). The Hague: ISNAR.

Enyong, L. K. (1993). Linkages among research, education, extension, and farmers in the Republic of Cameroon. Unpublished doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg.

Eponou, T. (1990). Informational mechanisms and technology transfer: The case of PACO in Cote D'Ivoire (Linkage Discussion Paper Series No. 7). The Hague: ISNAR.

Eponou,T. (1993). Linking research and technology transfer to serve farmers: Partners in agricultural technology (ISNAR Research Report No. 1). The Hague: ISNAR.

Eponou, T. (1996). Linkages between research and farmers' organizations in three selected African countries: Partners in technology generation and transfer (ISNAR Research Report No. 9). The Hague: ISNAR.

Ewell, P. T. (1986). Designing and agricultural ecosystems for humid tropics. Annual review of ecological systems 17, 245-271.

Ewell, P. T. (1989). Linkages between on-farm research and extension in nine-countries (OFCOR Comparative Study Paper No.4) . The Hague: ISNAR.

Friedrich, K. H. & Hall, M. (1989). Farming systems development (FSD): FAO's reaction to the challenge of developing of developing sustainable farm-household systems. Rome: FAO, Farm management and Production Economic Service, unpublished report.

Havelock, R.G. (1969). Planning for innovation through dissemination and utilization of knowledge. Ann Arbor, MI: University of Michigan, Institute of Social Research, Center for Research in the Utilization of Scientific Knowledge.

Havelock, R. G. (1986a). The knowledge perspective: Definition and scope of a new study domain. In Beal, G.M., Dissanayake, W. & Konshima, S.. (Eds.), Knowledge generation, exchange and utilization (pp. 1-11). Boulder, CO: Westview Press.

Havelock, R. G. (1986b). Modeling the knowledge system: In Beal, G.M., Dissanayake, W. & Konshima, S.. (Eds.), Knowledge generation, exchange and utilization (pp. 77-105). Boulder, CO: Westview Press.

Haverkork, A. W. & Rooling, N. G. (1984). Six approaches to rural extension. Paper

presented at the seminar on strategies for agricultural extension in the Third World, International Agricultural Centre. Wageningen, Netherlands.

Heise, D. R. (1975). Causal analysis. New York: John Wiley and Sons.

Hornick, R. C. (1988). Development communication: Information, agriculture, and nutrition in the Third World. New York: Longman Inc.

Howell, J. (1984). Conditions for the design and management of agricultural extension. London: Agricultural Administrative Unit, Overseas Development Institute.

Jiggins, J (1989). Seminar proceedings: Part 1, International seminar on rural extension policies. Washington DC: International Agricultural Center.

Kaimowitz, D. (1988). Agricultural technology institutions in Columbia and the linkages between agricultural research and technology transfer within them: An introductory overview (ISNAR Staff Notes). The Hague: ISNAR

Kaimowitz, D., Snyder, M., & Engel, P. (1989). A conceptual framework for analyzing the links between research and technology transfer in developing countries. (Linkage theme paper No. 1). The Hague: ISNAR

Kaimowitz, D. & Merrill-Sands, D. (1989). Making the link between agricultural research and technology users. The Hague: ISNAR.

Kaimowitz, D. (Ed), (1990). Making the link: Agricultural research and technology transfer in developing countries. Boulder, CO: Westview Press.

Kaimowitz, D., Monteze, S., & Engel, P. (1990). A conceptual framework for studying the links between agricultural research and technological transfer in developing countries. In D. Kaimowitz (Ed.), Making the link: Agricultural research and technology transfer in developing countries (pp. 227-269). Boulder, CO: Westview Press.

Knox, A. B. (1986). Helping adults learn: A guide to planning, implementating,and conducting programs. San Francisco: Jossey-Bass.

Lawrence, P. & Lorsch, J. (1967). Organization and environment: Managing differentiation and integration. Homewood, Illinois: Irwin Press.

Leagans, Paul. J. & Loomis C.P. (1971). Behavioral change in agriculture: Concepts and strategies for influencing transition. New York: University Press.

Leonard, D. K. & Marshall, D. (1982). Institutions of rural development for the poor: Decentralization and organizational linkages. Research Series 49, IIS. Berkeley: University of California.

Lionberger, H. F. & Chang, H. C. (1970). Farm information for modernizing agriculture: The Taiwan system. New York: Praeger Press.

Lionberger, H. F. & Chang, H. C. (1981). Development and delivery of scientific farm information: The Taiwan system as an organization alternative to land grant universities. In B.R. Crouch & S. Chamala (Eds.), Extension education and rural development, Volume 1. International experience in communication and innovation. New York: John Wiley & Sons.

Lionberger, H. F. & P. H. Gwin (1982). Communication strategies: A guide for agricultural change agents. Danville, IL: The Interstate Printers and Publishers.

Lionberger, H. (1986). Towards an idealized systems model for generating and utilizing

information in modernizing societies. In G. Beal et al. (Eds.) Knowledge generation, exchange, and utilization. Boulder, CO: Westview Press.

Lippke, L.A., H. W. Ladewig & Powell-Taylor, E. (1987). National assessment of extension efforts to increase farm profitability through integrated programs: College Station, TX: Texas Agricultural Extension Service.

McClure, G. D. (1991). An integrated communication system for technology transfer: The CTTA Project. In Rivera, W.M. & Gustafson D.J. (Eds.), Agricultural extension: Worldwide institutional evolution and forces for change. (pp.175-185). New York: Elsevier.

McDermott, J. K. (1971). Extension institutions. In Blase, M. G. (Ed). Institutions in agricultural development (pp.151-161). Ames: Iowa State University Press

McDermott, J. K. (1987). Making extension effective: The role of extension and research linkages. In Rivera W., & Schram, S. (Eds). Agricultural extension world wide. New York: Croom Helm.

Merrill-Sands, D. & Kaimowitz, D. (1990). The Technology Triangle: Linking farmers, technology transfer agents and agricultural researchers. The Hague: ISNAR.

Merrill-Sands, D. & MacAllister, J. (1989). Strengthening the integration of on-farm client-oriented research and experiment station research in national agricultural research systems (NARS): Management lessons from nine country case studies. The Hague: ISNAR.

Mezirow, J. (1991). Transformation dimensions of adult learning. San Francisco: Jossey-Bass.

Moris, J. R. (1983). Reforming agricultural extension and research services in Africa: (Discussion Paper II). London: Overseas Development Institute.

Mosher, A. T. (1971). Agricultural development. In J. P. Leagans & C.P. Loomis Behavioral change in agriculture: Concepts and Strategies for influencing transition. New York: University Press.

Mott, P. E. (1972). The characteristics of effective organization. New York: Harper & Row.

Patton, M.Q. (1988). Extension's future: Beyond technology transfer. Knowledge, creation, diffusion, utilization, 9(4), 476-491.

Pray, C, E. & Echeverria, R. (1990). Private sector agricultural research and technology transfer links in developing countries. In D. Kaimowitz (Ed.), Making the link: Agricultural and technology transfer in developing countries (pp. 197-226). Boulder, CO: Westview Press.

Rhoades, R. E. (1984). Breaking new ground: Agricultural and topology. Lima, Peru: International Potato Center.

Rivera, W.M. & Gustafoson D.J. (Eds.). (1991). Agricultural extension: Worldwide institutional evolution and forces for change. New York: Elsevier.

Rogers, E. M., Ashcroft, J., Roling, G.N. (1970). Diffusion of innovation in Brazil, Nigeria and India. East Lansing: Michigan State University, Dept. of Communication.

Rogers, E., & Shoemaker, R. (1971). Communication of innovation: A cross-cultural approach. (2nd Ed.) New York: The Free Press.

Rogers, E. M. (1976). Communication and development: Critical perspectives. Beverly Hills, CA: Sage Publications.

Rogers, E. M. & Agarwala, R. (1976). Communications in organizations: New York: The Free Press.

Rogers, E. & Kincaid, D. (1981) Communication network: Toward a new paradigm for research. New York: The Free Press.

Rogers, E. M. (1983). Diffusion of innovations, 3rd edition. New York: The Free Press.

Roling, N. (1988). Extension science: Information systems in agricultural development. Cambridge, UK: Cambridge University Press.

Roling, N. (1986). Extension and the development of human resources: The other tradition in extension education. In G. E. Jones (Ed.), Investing in rural extension: strategies and goals (pp 51-65). London: Elsvier Applied Science Publishers.

Roling, N. (1990). The agricultural research-technology transfer interface: Knowledge systems perspective. In Kaimowitz, D. (Ed.), Making the link: Agricultural research and technology transfer in developing countries. (pp. 1-42). Boulder, CO: Westview Press.

Rothwell, R. & Robertson, A. B. (1973). The role of communication in technology innovations. Research policy (2).

Salant, P. & Dillman, D. A. (1994). How to conduct your own survey. John Wiley & Sons, Inc. New York.

Sall, A. B., Hamidou, D., Ousseini, E. M., & Kraft, N. P. (1986). Strengthening the linkages between research, extension and education in developing countries. Unpublished manuscript, University of Wisconsin, Madison.

Sands, C.M. (1988). The theoretical and empirical basis for analyzing agricultural technology systems. Unpublished doctoral thesis. Champaign-Urbana: University of Illinois.

Seegers, S. & Kaimowitz, D. (1989). Relations between agricultural researchers and extension workers: The survey evidence (Linkages Discussion Paper No. 2). The Hague: ISNAR.

Shaner, W. W., Philipp, P. F., & Schmehl, W. R. (1982). Farming systems research and development: Guidelines for developing countries. Boulder, CO: Westview Press.

Sims, H. & Leonard, D. (1989). The political economy of the development and transfer of agricultural technology. (Linkages theme paper No. 4). The Hague: ISNAR.

Sims, H. & Leonard, D. (1990). The political economy of the development and transfer of agricultural technology. In Kaimowitz, D. (Ed.), Making the link: Agricultural research and technology transfer in developing countries (pp. 43-74). Boulder, CO: Westview Press.

Singh, K. N. (1981). The need for a communication strategy for rural development. In B.R. Crouch and S. Chamala (Eds.), Extension education and rural development, Volume 2, Experience in strategies for planned change New York: John Wiley & Sons.

Snyder, M. (1986). A framework for analysis of agricultural research organizations and

extension linkages in West Africa. Unpublished doctoral thesis. Washington DC: George Washington University.

Swanson, B. (1984). Agricultural extension: A reference manual (2nd Ed.). Rome: Food and Agriculture Organization of the United Nations.

Swanson, B., Roling, N., & Jiggins, J. (1984). Extension strategies for technology utilization. In B. Swanson (Ed.), Agricultural extension: A reference manual, (2nd Ed.). Rome: Food and Agriculture Organization of the United Nations.

Swanson, B., & Claar, J. (1984). The history and development of agricultural extension. In Swanson, B (Ed.), Agricultural extension: A reference manual (2nd Ed.). Rome: Food and Agriculture Organization of the United Nations.

Spencer, D. (1986). Agricultural research : Lessons of the past, Strategies for the future. In Berg, R. & Whitaker, J (Ed.), Strategies for African Development: Berkeley: University of California Press.

Tchouamo, I.R. (1987). Perception by farmers, extension agents and researchers of linkages among and between organizations involved in the development and dissemination of agricultural innovations in Cameroon (Doctoral dissertation, Michigan State University, (1987). (University Microfilms International, No. 8807127)

Van den Ban, A.W. & Muntjewerff, C. A. (1981). Goals, organization, and strategies of change agencies: In B.R. Crouch and S. Chamala (Eds.), Extension education and rural development, Volume 2, Experience in strategies for planned change. New York: John Wiley & Sons.

Van den Ban, A.W. & Hawkins, S. (1988). Agricultural extension. Harlow: Longman.

Wete, F. N. (1991). New technology for transferring agricultural information: In Rivera, W.M. & Gustafson D.J. (Eds.). Agricultural extension: Worldwide institutional evolution and forces for change. New York: Elsevier.

Webster, (1989). The new lexicon: Webster's dictionary of the English language. New York: Lexicon Publications.

World Bank. (1990). National agricultural extension and training project: Staff appraisal report. Yaounde, Cameroon: World Bank.

World Bank. (1990a). Agricultural extension: The next step (Policy and Research Paper No.13). Washington, DC: World Bank.

World Bank. (1985). Agricultural research and extension: An evaluation of the World Bank's experience. Washington, DC: World Bank.

World Bank. (1987). Agricultural research and extension: An evaluation of the World Bank's experience. Washington, DC: World Bank.